



Research for a Cure

*Spread the Word, Once and for All
The Lung Cancer
Prevention & Detection Kit*



*About
“Spread the Word, Once and for All”
The NCFR Lung Cancer Prevention and Detection Kit*

Lung cancer is the leading killer among all types of cancer in the US. It accounts for more deaths than any other cancer in both men and women. In 2010, an estimated 157,000 people lost their battle with this lethal disease. This Kit is your chance to make a difference. Follow the tips and suggestions listed here, and share this critical information with everyone in your life, in the hope that it might help spread awareness of lung cancer and help save and extend even one more life. Visit the National Foundation for Cancer Research at www.NFCR.org for more information on how you can help.

Lung Cancer in The United States

Lung cancer claims more lives than are lost from colon, breast, and prostate cancer combined. Lung cancer accounts for about 15% of all new cancer cases each year, but causes nearly 30% of all cancer deaths. Over the past three decades, little improvement has been achieved in extending the lives of lung cancer patients. In the late 1970s, about 37% of people survived one year or longer after initial diagnosis; now, three decades later, this number has only improved to 42%.

What Is Lung Cancer and How Do People Get It?

Lung cancer is characterized by the uncontrolled growth of abnormal cells in one or both of the lungs. The majority of lung cancers begin in the bronchial tubes that conduct air in and out of the lungs. While there are more than a dozen different kinds of lung cancer, the two main types of lung cancer are “non-small cell” and “small cell,” which together account for over 90% of all lung cancers. Non-small cell lung cancer accounts for approximately 75% of these cancers and consists of squamous cell, adenocarcinoma and large cell types. Small cell lung cancer represents 20-25% of all lung cancers and is also referred to as “oat cell cancer” because of the shape of cells when examined under the microscope.



WHO is Getting Lung Cancer?

Though lung cancer incidence is second to breast cancer in women and second to prostate cancer in men, more people die from lung cancer than any other type of cancer. This is true for both men and women.

The risk of developing lung cancer is about 23 times higher in male smokers and 13 times higher in female smokers, compared to lifelong nonsmokers. According to the Center for Disease Control, about 90% of lung cancer deaths in men and almost 80% of lung cancer deaths in women are due to smoking.† †

In 2010, it is estimated that

- there were 222,520 new cases of lung cancer, 116,750 men and 105,770 women†
- 157,300 patients lost their battle with lung cancer, 86,220 men and 71,080 women †

It is encouraging that the number of lung cancer diagnoses and deaths has trended slightly downward in recent years. The trend began sooner for men than for women and experts believe this pattern reflects differences in smoking behaviors that began to occur several decades ago. Smoking declined at a greater rate among male smokers than female smokers beginning in the 1950s.

Finally, lung cancer in the US crosses all ethnic boundaries. It is the second most common cancer among white, black, Asian/Pacific Islander, and American Indian/Alaska Native men, and the third most common cancer among Hispanic men. The story is no better for women in the United States. Lung cancer is the second most common cancer among white, black, and American Indian/Alaska Native women, and the third most common cancer among Asian/Pacific Islander and Hispanic women.† †

† American Cancer Society, 2010.U.S.

† †Cancer Statistics Working Group. *United States Cancer Statistics: 1999–Incidence and Mortality Web-based Report*. Atlanta (GA): Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2010. Available at: <http://www.cdc.gov/uscs>.



Risk Factors for Lung Cancer

- **Cigarette smoking** is the most important risk factor! And that risk increases with the quantity and the duration of cigarette consumption. Cigar and pipe smoking also increase risk, as does the use of chewing tobacco, which is also implicated in a number of other types of cancer. The risk of lung cancer is just as high for smokers of “light” or “low-tar” yield cigarettes as for those who smoke “regular” or “full-flavored” products.
- **Secondhand tobacco smoke** comes from burning cigarettes or other tobacco products, or is exhaled by smokers. When you inhale secondhand smoke, you are exposed to the same cancer-causing agents as smokers, although in smaller amounts.
- **Environmental Factors**
 - * **Air pollution** is now considered to be a risk factor.
 - * **Radon gas** from the breakdown of uranium in rocks and soil can leak into the air or water supply of homes or buildings through cracks in walls or foundations. You can reduce or eliminate your exposure to radon by having your home tested and treated.
 - * **Other exposures of concern** include asbestos, certain metals such as chromium, cadmium, arsenic, and some organic chemicals. Although the risk of lung cancer from such exposure is not as great as the risk from cigarette smoke, your risk increases more if you are a smoker and you are exposed to these agents in the workplace or elsewhere.
- **Alcohol use** – drinking large amounts is linked to an increased risk of lung cancer.
- **Beta carotene supplements in heavy smokers.** Taking beta-carotene supplements (pills) can increase the risk of lung cancer in smokers who smoke one or more packs a day. The risk is higher in smokers who also drink one or more alcoholic drinks every day.
- **History of tuberculosis** is a potential risk factor for certain types of lung cancer.
- **Genetic susceptibility** plays a contributing role in the development of lung cancer, especially in those who develop the disease at a younger age.
- **Age** – about 2 out of 3 people diagnosed with lung cancer are older than 65. Less than 3% of all diagnoses are made in people younger than 45.



Prevention - What You Can Do To Lower Your Risk Of Lung Cancer?

Avoiding the known risk factors for lung cancer and increasing your adherence to the protective factors outlined below may help you prevent lung cancer. Talk to your doctor or other health care professional about how you might lower your risk of lung cancer. Practice these protective measures and share them with your friends and loved ones.

- **Do not smoke!** The best way to prevent lung cancer is to not smoke.
- **If you do smoke, quit! Today!** The chances of preventing lung cancer often depend on how many years and how much a person has smoked and the length of time since quitting. In fact, quitting may lower your risk of lung cancer and help you live longer no matter what your age is or how long you have smoked.
 - * Compared with those who continue to smoke, people who do quit before they are 50 years old cut in half their risk of dying in the next 15 years.
 - * In smokers who have been treated for lung cancer, quitting smoking lowers their risk of lung cancer recurrence.
 - * **Counseling**, the use of nicotine replacement products (such as gum, patches, sprays, lozenges, or inhalers), and antidepressant therapy have helped many smokers quit for good.
- **Have your home tested for radon.**
- **Eating more fruits and vegetables** - Studies show that eating a lot of fruits and vegetables may help lower the risk of lung cancer.
- **Regular exercise and other physical activity** may lower the risk of lung cancer. Physical activity can lower the risk of lung cancer even in people who do smoke tobacco products.
- **Lung cancer prevention clinical trials are used to study ways to prevent or lower the risk of developing cancer.** Some cancer prevention clinical trials seek to find out whether actions people take can actually prevent cancer. These beneficial lifestyle decisions may include eating more fruits and vegetables, exercising regularly, quitting smoking, or taking certain medicines, vitamins, minerals, or food supplements.
- **Stay informed.** Cancer research breakthroughs are constantly introducing new findings. Be aware of the most up-to-date prevention information by visiting forums such as www.NFCR.org.

Symptoms Of Lung Cancer

The common symptoms of lung cancer are also, and more likely, related to conditions other than lung cancer. Since most lung cancers do not cause any symptoms until they have spread too far to be cured, it is important to see your doctor right away so the cause of persistent symptoms can be determined. As with any type of cancer, if you go to your doctor when you first notice symptoms, the cancer may be diagnosed at an earlier stage – when treatment is most effective.

- Persistent cough
- New onset of wheezing
- Chest pain that is often worse with deep breathing, coughing, or laughing
- Sputum streaked with blood
- Recurrent pneumonia or bronchitis
- Shortness of breath
- Hoarseness

Detection*

Doctors have a wide range of diagnostic procedures and tests available to detect the presence of lung cancer. These include, but are not limited to:

A careful consideration of your **health history and a thorough physical examination** may reveal symptoms or signs that are of concern or are known indicators of lung cancer. In addition to asking about symptoms and risk factors for cancer development such as smoking, doctors may detect signs of breathing difficulties, airway obstruction, or infections in the lungs.

Chest X-ray - most common first diagnostic step when any new symptoms that may indicate lung cancer are present. Although the X-ray may reveal suspicious areas in the lung, it is unable to determine if these areas are cancerous.

CT (computerized tomography, computerized axial tomography, or CAT) scans may be performed if the X-ray did not show an abnormality or did not yield sufficient information to confirm the presence of a tumor in the lungs.

Magnetic resonance imaging (MRI) scans may be appropriate when precise details about a tumor's location are required. The MRI technique uses magnetism, radio waves, and a computer to produce images of body structures.

Positron emission tomography (PET) scanning is a specialized imaging technique that uses short-lived radioactive drugs to produce three-dimensional colored images of those substances in the tissues within the body. Different from CT scans and MRI scans, PET scans measure metabolic activity and the function of tissues. PET scans can determine whether a tumor is actively growing and can aid in determining the type of cells within a particular tumor.

Bone scans are used to create images of bones on a computer screen or on film. Doctors may order a bone scan to determine whether a lung cancer has metastasized to the bones.

Biopsy or Sampling of Tissues and Cells

A confirmation of the presence of lung cancer is done from inspection and analysis of the suspected cells or tissue from phlegm (sputum) or from biopsy samples. A pathologist confirms the presence of cancer by checking the samples of lung cells and tissue under a microscope. **Molecular tests** can be conducted on biopsy samples to detect abnormal genes and proteins (**biomarkers**) on cancer cells. The biomarkers can help determine the stage of lung cancer and guide treatment with the newer anti-cancer drugs (**targeted therapies**.)

*These are suggested detection tests for the lung cancer patients, regardless of the risk factors. Please consult your physician for the most appropriate screening tailored to your risk profile.

Treatment

When lung cancer is diagnosed, the doctor must determine the type (small cell or non-small cell) and the extent of spread, or stage, of the cancer in order to decide on the best course of treatment for each patient.

Surgery - During surgery, your surgeon works to remove the lung cancer and a margin of healthy tissue surrounding it. For localized cancers, surgery is usually the treatment of choice.

Chemotherapy - Uses drugs to kill cancer cells that are rapidly dividing. One or more chemotherapy drugs may be administered through a vein in your arm (intravenously) or orally over a period of weeks or months.

- Chemotherapy can be used as a first line treatment for lung cancer or as additional treatment after surgery. Recent analyses confirm that survival for all patients with early stage, non-small cell lung cancer (NSCLC) is improved by administering chemotherapy after surgery.
- Side effects occur since these drugs can harm normal cells that divide rapidly, too, such as blood cells, cells in hair roots, and cells that line the digestive tract. You may experience weakness, hair loss, and unpleasant gastrointestinal symptoms such as nausea, vomiting, and diarrhea. Your doctor can suggest ways to control for many of these effects.

A combination of chemotherapy drugs is usually the main initial treatment for small cell lung cancer (SCLC). Some combinations are:*

- Cisplatin or Carboplatin with etoposide
- Cisplatin or Carboplatin with irinotecan
- Cyclophosphamide, doxorubicin (Adriamycin), and vincristine

A combination of 2 chemotherapy drugs for NSCLC may include: *

- Cisplatin
- Carboplatin
- Paclitaxel
- Docetaxel
- Gemcitabine
- Vinorelbine

* From American Cancer Society, 2010. There may be other chemotherapy drugs and combinations of drugs that your doctor may suggest.

Radiation therapy - Radiation therapy uses high-powered energy beams, such as X-rays, to kill cancer cells. Radiation therapy can be directed at your lung cancer from outside your body (external beam radiation) or it can be put inside needles, seeds or catheters and placed inside your body near the cancer (brachytherapy). Radiation therapy can be used alone or with other lung cancer treatments. Sometimes it's administered at the same time as chemotherapy.

Targeted drug therapy – This strategy involves newer cancer treatments that work by targeting specific molecular pathways involved in cancer growth and survival.

Presently, there are three targeted therapy options for treating advanced NSCLC††:

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- **Avastin® (generic name bevacizumab)** helps prevent a tumor from creating its own new blood vessels that supply oxygen and nutrients. Avastin is usually used in combination with chemotherapy and is approved for advanced and recurrent non-small cell lung cancer.

Patients on Avastin may experience high blood pressure, tiredness, headaches, mouth sores, low white blood cell counts, headaches, loss of appetite, and diarrhea. Some serious bleeding may occur.

- **Tarceva® (generic name erlotinib)** blocks chemicals that signal the cancer cells to grow and divide. Tarceva is approved for people with advanced and recurrent non-small cell lung cancer who have not been helped by chemotherapy.

Side effects can include an acne-like rash on the face and chest, diarrhea, loss of appetite, and feeling tired.

- **Iressa® (generic name gefitinib)** also blocks the Epidermal Growth Factor Receptor (EGFR) from signaling cells to grow. Iressa is only approved to be used to patients who, in the opinion of their treating physician, are currently benefiting, or have previously benefited, from Iressa treatment. The FDA limits the use of Iressa because new clinical trials have not shown Iressa to benefit all NSCLC patients.

†† From the National Cancer Institute, National Institutes of Health.

Discuss with your doctor to see if either of these drugs are suitable to your type of NSCLC.

Clinical trials - are studies of experimental lung cancer treatment methods or drugs on human subjects. If standard lung cancer treatments aren't working or if your treatment options are limited, enrolling in a clinical trial may be a way to treat your cancer. Carefully weigh your treatment options with your doctor. Your participation in a clinical trial may help doctors better understand how to treat lung cancer in the future.

If you are diagnosed with lung cancer, please consult your doctor about the best treatment options customized to your personal profile. You could get a personalized report of treatment options using [NFCR's Treatment Decision Tools](#).



Research Breakthroughs

Lung cancer is the leading killer among all cancer types in the US. NFCR believes that through research, there is hope that one day we will find ways to cure this deadly disease. NFCR funds leading researchers who are committed to finding more effective strategies for preventing, diagnosing, and treating lung cancer.

Here are a few notable accomplishments and breakthroughs in lung cancer research achieved by NFCR scientists:

- 1. Targeted therapy that shuts down a tumor's blood supply.** NFCR scientist discovered that vascular endothelial cell growth factor (VEGF) is a critical protein that helps form new blood vessels which nourish malignant tumors. This breakthrough led the research community to develop Avastin®, the targeted therapy that binds VEGF to stop the formation of new blood vessels which would support the tumor. Today, Avastin is utilized around the world to treat advanced and recurrent non-small cell lung cancer as well several other major types of cancer.
- 2. Building risk prediction models for smoking-related lung cancer.** NFCR scientist is building “risk prediction models” that help to predict patient’s risk of having lung cancer recurrence. From clinical trials and collaborative research, NFCR scientist has identified 21 (twenty-one) biomarkers that are leading researchers to a deeper understanding of tumor development in smoking-related lung cancer. The results of their ongoing analysis will serve as the foundation for a chemoprevention program for lung cancer. This type of program could enable doctors to provide personalized chemoprevention methods and give the best care to smokers or previous smokers who are at high risk for lung cancer or lung cancer recurrence.
- 3. Detecting cancer cells in blood.** NFCR scientists have developed a very sensitive, yet simple-to-use, blood test that can detect, isolate, and capture a single cancer cell from among one billion cells in human blood. Stray cancer cells in the blood mean that a tumor, which may or may not be detectable, could be spreading (metastasizing). A test that can identify such cells has the potential to detect cancer earlier and revolutionize treatment for many types of cancer. Ongoing research is identifying abnormal genes and proteins in the stray cancer cells that allow them to migrate away from the primary tumor and enter the blood stream during the early stages of metastasis. These molecules can serve as targets for developing therapeutic agents that could prevent cancer from spreading, which would dramatically improve patient outcomes.
- 4. Identification of gene signatures and biomarkers in early lung cancer.** Knowing the molecular events in early stage lung cancer will allow doctors to better predict a patient’s survival outcome and may lead to the development of agents that target the genes and their products - options that these patients greatly need after their initial surgery. NFCR scientists identified a six-gene signature that may predict survival of patients with one subtype of NSCLC. One gene’s protein product has the potential to become a powerful biomarker to predict progression and outcome of early stage NSCLC. Research led by this NFCR-sponsored research team is leading to new chemoprevention and treatment strategies that will impact lung cancer- at the earliest stage.
- 5. Development of a new targeted anti-cancer drug for patients with small cell lung cancer.** NFCR scientist designed and synthesized Onrigin™, a promising new anti-cancer drug for patients with small cell lung cancer (SCLC) and several other types of cancer. To make Onrigin even more effective, a new design allows an inactive form of the drug to convert to the active, cell-killing form only after it enters a cancer cell but not in normal, healthy cells. This new drug may also allow targeting of metastatic lung cancer cells that

have spread to distant sites in the body. With this innovative drug design, the scientist envisions that this new targeted drug will cause little toxicity while effectively treating patients whose lung cancer is resistant to existing therapies

6. **Personalized medicine for non-small cell lung cancer patients.** NFCR scientists initiated the BATTLE program, or **B**iomarker-Based Approaches of Targeted Therapy for **L**ung Cancer **E**limination, to develop individualized targeted therapies for patients with advanced NSCLC that is resistant to chemotherapy. The BATTLE program included four clinical trials in which patients were assigned to the treatment drug to which they were most likely to respond based on their personal biomarker profiles identified through tumor biopsies. BATTLE is an important initiative to move personalized medicine forward for lung cancer patients, improving treatment efficacy for individual patients.

For more information on these research programs, visit www.NFCR.org/Research

How You Can Help

These NFCR-supported research projects hold great promise for improving the treatment and survival of lung cancer patients, or possibly preventing lung cancer in the first place. With more funding, NFCR could enable these dedicated scientists to ramp up their efforts and accelerate their research progress to save more lives sooner.

You can take action to help prevent and cure lung cancer! Start now by visiting us at www.NFCR.org. From there you can click on the following tabs to learn more about how to get involved:

- **Share this Prevention and Detection Kit** with friends or family members.
- **Donate** through NFCR programs to support our scientists in accomplishing important research to develop better cancer treatment and prevention strategies.
- **Volunteer** your time to raise awareness of NFCR's research mission and support cancer research:
 - o **Launch your own fundraising event for NFCR**
 - o **Start your own fundraiser webpage**
 - o **Sign the World Cancer Declaration**

We encourage and invite you to join the hundreds of thousands of individuals around the globe who share your passion, and ours, for conquering cancer in our lifetimes. They are helping NFCR save lives through cutting-edge lung cancer research. You can help, too.

Find out What's New:

